

A Remarkable New Species of *Stephensia* Stainton (Insecta: Lepidoptera: Elachistidae) from Belize Rainforest (Central America)

Virginijus Sruoga* and Rimantas Puplėsis

Department of Zoology, Vilnius Pedagogical University, 39, Studentu str., Vilnius 2004 LT, Lithuania

ABSTRACT—*Stephensia armata* sp. n., a remarkable species is described from Belize (Central America). The external features and genitalia of the male are figured and described in detail. A distribution map for all six Elachistidae species, currently recorded from tropical America, is given: *Perittia smaragdophanes* (Meyrick), *P. punatensis* Kaila, *Elachista albisquamella* Zeller, *E. saccharella* (Busck), *E. vasrana* Kaila and *Stephensia armata* Sruoga, sp. n.

Key words: Lepidoptera, Elachistidae, *Stephensia*, new species, Belize

INTRODUCTION

The Neotropical Region, while vast and with a hugely diverse biota, is comparatively unexplored with respect to collection and study of Elachistidae. It had been tacitly assumed that the Elachistidae had little or no representation in the humid tropics. The first species recorded from the

tropics of the region, *Elachista albisquamella*, was described by Zeller (1877) from Colombian material. Much later, one further species was reported from Ecuador (*Perittia smaragdophanes*) by Meyrick (1932) and one (*Elachista saccharella*) from Cuba by Busck (1934). During the last seven to eight decades there have been practically no investigations of tropical Elachistidae of the New World. Recent efforts to collect South American Microlepidoptera have yielded additional specimens of Elachistidae, including two species from Bolivia and Peru: *Perittia punatensis* and *Elachista vasrana* (Kaila, 2000) (Fig. 1).

The Belize collecting trip, undertaken in April 1998 by the second author with the assistance of Simon Hill (University of Westminster, UK), has resulted in the discovery of a remarkable new species – *Stephensia armata* sp. n.

MATERIALS AND METHODS

Material studied was collected during Microlepidoptera collecting trip by the second author, accompanied by S. R. Hill (University of Westminster, UK) in Belize, Las Cuevas Research Station (April 1998). Adult moths were obtained by attracting them to mercury-vapour light from a lamp suspended slightly above eye-level and 5–10 cm in front of a white screen, rather closer than is usual in the standard method for light-collecting (described by Robinson *et al.*, 1994) in which the lamp is about 0.5 m from illuminated surface. A Honda EX 350 generator was used as a power-source. Moths attracted to the screen were collected into small glass tubes and pinned after killing with ethyl acetate.

Genitalia were prepared following the method described by Robinson (1976) and Traugott-Olsen, Nielsen (1977). After maceration of the abdomen in 10% KOH and subsequent cleaning, male genital capsule was removed. The genitalia were studied and some morphological structures were sketched in glycerol before permanent mounting in Euparal. The aedeagus was removed and

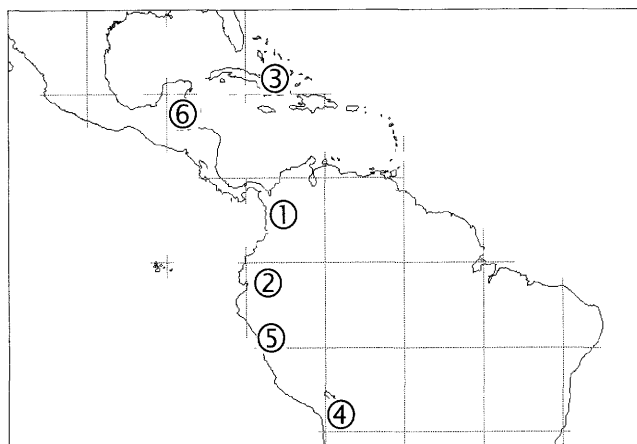


Fig. 1. Distribution map of Elachistidae species recorded from the tropical America: 1, *Elachista albisquamella* Zeller (1877); 2, *Perittia smaragdophanes* (Meyrick, 1932); 3, *Elachista saccharella* (Busck, 1934); 4, *Perittia punatensis* Kaila, 2000; 5, *Elachista vasrana* Kaila, 2000; 6, *Stephensia armata* Sruoga, new species.

Note: a taxonomic position of *Elachista tersectella* described from Bogota, Colombia by Zeller, 1877 and *Atmozostis hilda* from Cali, Colombia by Meyrick, 1932 has not been proven yet (Kaila, 2000), therefore, the species are not mapped.

* Corresponding author: Tel. +370-614-719-13;
Fax. +370-521-234-51.
E-mail: sruogavir@vpu.lt; r.puplėsis@vpu.lt

mounted alongside the genital armature. Genital capsule was stained with fuchsin and abdominal pelt with Chlorazol Black (Direct Black 38/Azo Black).

Forewing length is measured along the costa from wing base to the apex of the cilia (apex of the terminal fringe scales). For a wingspan, the forewing length was doubled and thorax width added.

The terminology used for morphological structures mostly follows that of Traugott-Olsen, Nielsen, 1977 and Kaila, 1999.

The type of the newly described species is deposited in the collection of The Natural History Museum, London, UK (formerly British Museum, Natural History)(BMNH).

DESCRIPTION

Family Elachistidae Bruand, 1850

Genus *Stephensia* Stainton, 1858

Stephensia armata Sruoga, new species
(Figs. 1–4)

Type material: Holotype: male, Belize, Cayo Distr., Chiquibul Forest Reserve, Las Cuevas Research Station, 3–16 April 1998, R. Puplesis and S. R. Hill, genitalia slide No. 29591 (BMNH).

Habitat: At the collecting site (on hillsides and valley bottom) the forest has a greater proportion of evergreen species, e.g., *Manilkara zapota*, *Calophyllum brasiliense* and *Aspidosperma megalocarpum*, although deciduous species such as *Swietenia macrophylla* and *Terminalia amazonia* are still an important component (Fig. 2). The majority of the vegetation is intermediate-age (ca. 30 yrs) secondary forest. The area receives between 1500 and 2000 mm of rain per annum (Puplesis, Robinson, 2000). Rainfall is not distributed regularly throughout the year for there are two dry seasons (from February to June and again for two to three weeks in August).

Description: Male (Fig. 3A). Forewing length: 3 mm. Wingspan: 6.6 mm. Head: ochreous white; background layer of frons scales with some metallic lustre; neck tufts matching head coloration but caudally dark ochre; labial palpi very short and straight, as long as the eye diameter; scape large and wide, about 3 times broader than flagellum,

pale ochre, with a few darker scales distally; flagellum unicolorous, dark brown-grey. Thorax and tegulae dark ochre. Forewing dark ochre but costal area grey-brown, and some grey-brown scales densely scattered distally; transverse fascia antemedian, white and straight; costal and tornal spots small and ill-defined, pale ochre; fringe scales dark ochre, slightly paler apically. Hindwing and its fringe grey-brown. Abdomen grey-brown on upperside, paler on underside; each segment with pale ochre scales distally; genital tuft pale ochre.

Female unknown.

Male genitalia (Figs. 3B, C and 4). Uncus very small. Gnathos oval; basal arms strongly sclerotized distally; arms not fused medially, with long extensions proximally; spines of gnathos long and stout. Valva short and slender, broadened basally; cucullus narrow, apically rounded. Valval process strongly sclerotized and fused with caudally projected, strongly sclerotized lobe (Fig. 4A) which possessing two or three stout teeth apically (Fig. 4B). Transtilla strongly reinforced. Juxta large; proximal part of ventral shield strongly sclerotized, with lateral extensions; lobes long, distally tapering, sparsely setose. Vinculum narrow, proximal area extended ventrally. Saccus very small, visible in lateral view. Aedeagus long and slender, strongly sclerotized, tapering into acute apex distally; caecum very long, with well-developed manica.

Distribution. Belize rainforest (Chiquibul) (Fig. 1).

Etymology: *Armata* (Latin)=armed; the name refers to the armed valvae (possessing 2–3 stout teeth).

Diagnosis: The new species is one of the most striking representatives of *Stephensia* (Elachistidae) in the remarkable forewing pattern with a single transverse fascia, the distinctively long and strongly sclerotized valval lobe, and very long lobes of juxta.

Among currently known congeneric American species, *S. cunilae* Braun (USA: Ohio, Kentucky, Indiana) and *S. major* (Kearfott) (USA: North Carolina) it also differs in the deep median split between the remarkably large juxta lobes, and in the reduced uncus.

Phylogenetically *S. armata* is markedly apomorphic.

DISCUSSION

During the last decade the taxonomy of the Elachistidae has got dramatic changes. Traugott-Olsen (1995a, 1995b, 1995c, 1996) proposed the classification, introducing a considerable number of new generic names. Most of species, however, were assigned to the large genus, *Elachista*. The remaining species were scattered among small, often monotypic, genera. In general, in the recent classifications, the number of valid genera has varied between fifteen (Hodges, 1998) and twenty-five (Traugott-Olsen, 1995a, 1995b, 1995c, 1996). These unexpected and sudden changes in the taxonomy concept of the family were met with suspicion by most lepidopterists, and some doubts were expressed in unpublished communications.



Fig. 2. Collecting site of *Stephensia armata* sp. n. at Las Cuevas Research Station, Belize (at the right side - the collector Simon R. Hill).

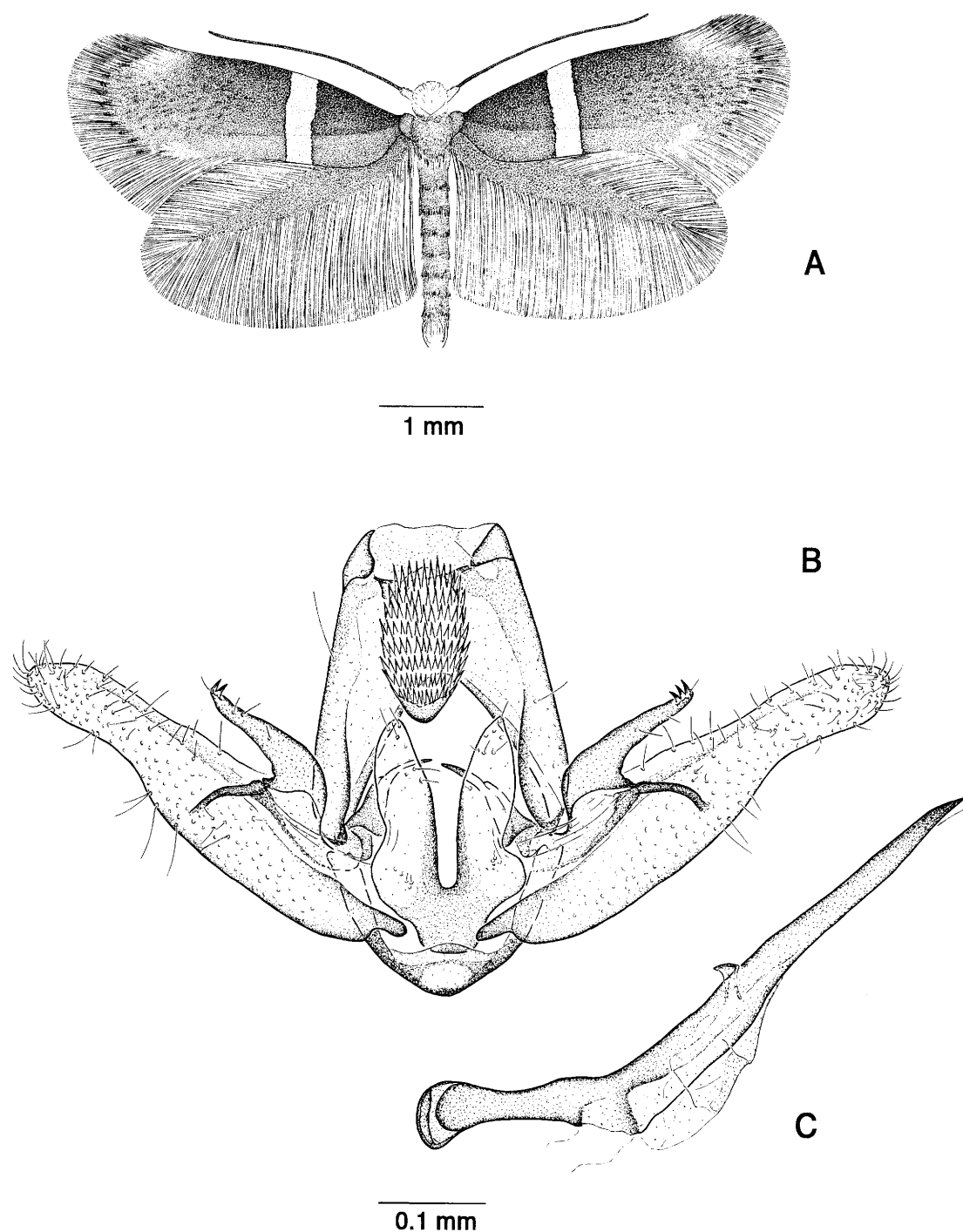


Fig. 3. *Stephensia armata* sp. n., holotype: A, external view; B, male genital capsule; C, same, aedeagus.

In the latest exhaustive worldwide treatment of the family by Kaila (1999) the most of genera were synonymized, and only three genera of the Elachistidae were recognized for the world fauna: *Perittia* Stainton, *Stephensia* Stainton and *Elachista* Treitschke. In the present paper we follow this concept of the family. We also think that the inclusive generic concept within Elachistidae would lead to a more stable nomenclature than would the alternative.

According to Kaila (1999), in male genitalia, *Stephensia* may be characterized by two apomorphic characters: 1) caecum of aedeagus much prolonged; 2) valval process membranous containing tongue-shaped extension. In the

new species, *armata*, the caecum of aedeagus is very long and, therefore, remarkably well supports the concept of *Stephensia*. The valval process of *armata* is also with a large lobe-like extension and fits to *Stephensia* diagnosis. The undifferentiated male tergum 8 and the presence of a dorsal shield of juxta (i. e., the additional characters for *Stephensia* listed by Kaila, 1999) were found as characteristic for *armata* sp. n. too.

Other distinctive features, such as the strong sclerotization of valval process together with the stout teeth suggest that *armata* occupies a somewhat isolated phylogenetical position within *Stephensia* but are not referred by us as

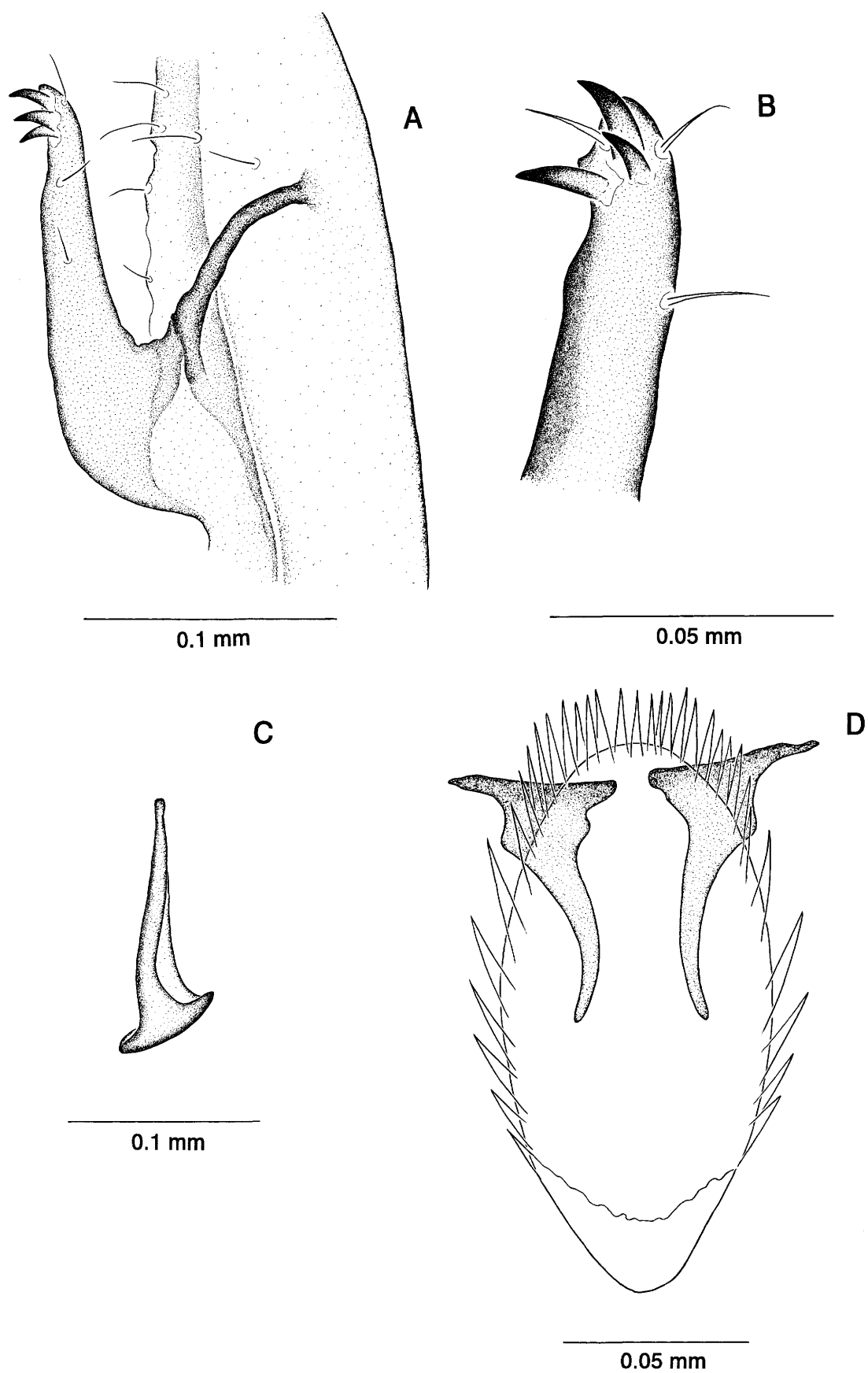


Fig. 4. *Stephensia armata* sp. n. male genitalia, holotype: A, basal area of valva; B, apex of valval lobe; C, vinculum and saccus in lateral view; D, basal arms of gnathos.

characters of a generic rank. However, following reviewers' comments, we agree that the sclerotization of valval process and the shape of uncus may be considered as unusual.

In order to preserve nomenclatorial stability, it is considered better to include the new species in *Stephensia* than to propose a new genus on the basis of the sclerotization of valval process or the reduced uncus. As morphologically remarkable and the first *Stephensia* from the tropical rainforest, its discovery begs several questions regarding the phylogenetic and biogeographic origins of the genus.

ACKNOWLEDGEMENTS

We are most grateful to Mr. Simon R. Hill for his generous help with planning fieldwork, transport of equipment and technical assistance during the Belize expedition in 1998. Also we thank the staff of the Las Cuevas Research Station, Belize, particularly Dr. Chris Minty, for support. Special thanks are due to Lina Jasiukonyte (Vilnius, Lithuania) for making indian-ink drawing of the adult. We also thank two anonymous reviewers for the helpful comments.

REFERENCES

- Bruand MT (1850) Catalogue systématique et synonymique des Lépidoptères du département du Doubs. Tinéides. Mém Soc Emul Doubs (1) 3(3): 23–68
- Busck A (1934) Microlepidoptera of Cuba. Entom Amer 13: 151–217
- Hodges RW (1998) The Gelechioidea. In "Handbook of Zoology/Handbuch der Zoologie, 1" Ed by NP Kristensen, Walter de Gruyter GmbH&Co, Berlin & New York, pp 131–158
- Kaila L (1999) Phylogeny and classification of the Elachistidae s. s. (Lepidoptera: Gelechioidea). Syst Entom 24: 139–169
- Kaila L (2000) A review of the South American Elachistidae s. str. (Lepidoptera, Gelechioidea), with descriptions of 15 new species. Steenstrupia 25: 159–193
- Meyrick E (1932) Exotic Microlepidoptera IV, Privately published, pp 193–224
- Puplesis R, Robinson GS (2000) A review of the Central and South American Nepticulidae (Lepidoptera) with special reference to Belize. Bull Nat Hist Mus, London (Entom) 69: 3–114
- Robinson GS (1976) The preparation of slides of Lepidoptera genitalia with special reference to the Microlepidoptera. Entom Gaz 27: 127–132
- Robinson GS, Tuck KR, Shaffer M (1994) A Field Guide to the Smaller Moths of South-East Asia. Malaysian Nature Society, Kuala Lumpur
- Stainton HT (1858) On the aberrant species hitherto placed in the genus *Elachista*. Trans ent Soc Lond 4: 261–271
- Traugott-Olsen E (1995a) Phylogeny of the subfamily *Elachistinae* s. str. Part I: *Mendesiini*, with some taxonomic revision and descriptions of new taxa (Lepidoptera: Elachistidae). SHILAP Revta lepid 23: 153–180
- Traugott-Olsen E (1995b) Phylogeny of the subfamily *Elachistinae* s. str. Part II. *Perittiini*, with some taxonomic revision and descriptions of new taxa (Lepidoptera: Elachistidae). SHILAP Revta lepid 23: 257–290
- Traugott-Olsen E (1995c) Phylogeny of the subfamily *Elachistinae* s. str. Part III: *Whitebreadiini*, with some taxonomic revision and descriptions of new taxa (Lepidoptera: Elachistidae). SHILAP Revta lepid 23: 417–449
- Traugott-Olsen E (1996) Phylogeny of the subfamily *Elachistinae* s. str. Part IV: *Stephensiini*, with some taxonomic revision and descriptions of new taxa (Lepidoptera: Elachistidae). SHILAP Revta lepid 24: 129–149
- Traugott-Olsen E, Nielsen ES (1977) The Elachistidae (Lepidoptera) of Fennoscandia and Denmark. Fauna Entom Scand 6: 1–299
- Zeller PC (1877) Exotische Microlepidoptera. Horae Soc Entom Rossicae 13: 1–494

(Received May 6, 2003 / Accepted July 29, 2003)